[Second Edition.]

PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in or relating to Glass Feeding Machines.

We, THE UNITED GLASS BOTTLE MANUFACTURERS LIMITED, a British company, and JOHN TIPPING, Engineer, a subject of the King of Great Britain, both of 40/45, Norfolk Street, Strand, London, W.C. 2, in the County of Middlesex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

This invention relates to glass feeding machines wherein the molten glass is discharged through an aperture by a reciprocating plunger and severed by shears to form "gobs", which are delivered into the moulds of the glass forming machine.

In previous constructions of glass feeding machines of this type it has only been possible for the machine during its working to supply successive "gobs" of the same weight so that variations in the supply of the machine are limited and the chief object of the present invention is to render glass feeding machines of the above kind capable of supplying successive gobs of different weights and in a particular order to the glass forming machine.

According to the invention a glass feeding machine of the above type is provided with means for independently varying the time and stroke of the plunger in either direction and for independently timing the action of the shears in each successive gob or mould charge discharged by the plunger. The said means preferably comprises adjustable cams (hereinafter referred to as "driving cams") arranged to co-operate with adjustable fingers or levers which act through suitable gearing to reciprocate the plunger, separate fingers or levers being provided for controlling the up and down strokes thereof but operated by the same driving cam. The said driving cams also serve to control the operation of the shears for severing the glass discharged by the plunger from the machine through the medium of bleed valves which are capable of adjustment so as to vary the operation of the shears according to requirements.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be described more fully with reference to the accompanying drawings, in which :—

Figure 1 is a sectional elevation through part of the said means shewing chiefly the construction and arrangement of the driving cams and the disposition of the plunger and the shear operating cylinder of the glass feeding machine.

Figure 2 is a plan of Figure I shewing chiefly the arrangement of the driving cams and the adjustable fingers or levers for reciprocating the plunger of the glass feeding machine.

Figure 3 is an elevation of the adjustable fingers or levers.

Figures 4 and 5 are respectively an elevation and end view drawn to a larger scale of one of the adjustable fingers or levers, and

Figures 6, 7 and 8 shew diagrammatically three different positions to which the said fingers or levers have been adjusted to bring about corresponding variations in the stroke and rate of movement of the plunger of the glass feeding machine.

A, B, C and D are the driving cams in the form of annular shaped members having internal teeth. Each of the driving cams is provided with a cam roller a, b, c, d and a cam projection a^1, b^1, c^1, d^1 (see Figure 2). The said driving cams are arranged one above the other between two plates E and F both of which are keyed to a shaft G which passes through all the driving cams and is rotatably mounted in bearings g, g^1 in

[*Price* 1*s*.]

a casing H. The shaft G has keyed thereon a worm wheel g^2 which is engaged and driven by a worm J on a shaft j rotatably mounted in bearings j^1, j^2 in the casing H and adapted to be driven from the bottle forming machine (not shewn). The said plates E and F carry four shafts K^1, K^2, K^3, K^4 each of which has attached thereto two pinion wheels one of which is adapted to engage with a corresponding toothed recess in the plate E and the other with one of the internally toothed driving cams. In Figure 1 two of said rods, namely, K^1, K^2 are seen with their two pinion wheels k^1, k^{1x}, k^2, k^{2x}, the pinion wheels k^1 and k^2 being adapted to engage with the internally toothed recesses e^1, e^2 in the plate E and the pinion wheels k^{1x} and k^{2x} with the internal teeth on the driving cams B and C, it being understood that the pinion wheels on the other two spindles which do not appear in Figure 1 are adapted to engage by means of similar pinion wheels with corresponding internally toothed recesses similar to e^1, e^2 in the plate E and with the other two driving cams A and D. The shafts terminate at their upper ends in knurled knobs and at their lower ends fit into holes formed in the plate F, the arrangement of the said shafts being such that they can be displaced axially to bring their pinion wheels out of engagement with the internally toothed recesses in the plate E so as to enable the driving cams to be adjusted relatively to each other for the purpose subsequently described. One of the spindles K^2 is shewn with its pinion wheel k^2 out of engagement with the internally toothed recess e^2 but normally and during the working of the machine all the shafts would be in the position wherein their pinion wheels would engage their corresponding internally toothed recesses in the plate E. L^1, L^2, L^3, L^4 and L^{1x}, L^{2x}, L^{3x}, L^{4x}, are the adjustable fingers or levers for reciprocating the plunger of the machine the fingers or levers L^1 to L^4 effecting the down stroke of the plunger and the fingers or levers L^{1x} to L^{4x} the up stroke thereof. The fingers or levers L^1 to L^4 are mounted on a vertical shaft M and the fingers or levers L^{1x} to L^{4x} on another vertical shaft M^1, the said shafts being rotatably mounted in a supporting frame O in close proximity to the driving cams so that the cam rollers a, b, c, d thereon are able to come into contact with the ends of said fingers or levers and displace them during the rotation of the driving cams. The said fingers or levers are arranged one above the other on their shafts and are separated by yoke shaped members l^1, l^{1x} which in addition to another use hereinafter described act as collars (see Figure 3). The shafts M and M^1 have keyed thereto pinion wheels m and m^1 which mesh with each other. The pinion wheel m is in mesh with another pinion wheel m^2 which is connected by suitable shafting m^7 and bevel gearing to a shaft m^3 which runs across the top of the machine and is supported in suitable bearings m^4, m^{4x}. Keyed to the shaft m^3 is a pinion wheel m^5 which meshes with a toothed rack m^6 which has a suitable fixture at one end for attaching the plunger P of the machine thereto. In order to enable the fingers or levers to be adjusted they are carried in yoke shaped members l^1, l^{1x} (see more particularly Figure 4) which are keyed to shafts M or M^1 as the case may be. Mounted in the upper part of the yoke shaped members are worm wheels l^2, l^{2x} which engage correspondingly toothed parts l^3, l^{3x} on the upper part of the fingers or levers. The worm wheels l^2, l^{2x} terminate in knurled heads l^4, l^{4x} whereby the worm wheels can be readily rotated and radially move the fingers or levers. In addition to this adjustment a further adjustment for the lower ends or toe pieces of the fingers or levers which control the upstroke of the plunger is provided. For this purpose the lower ends or toe pieces are made separate from the upper or body part of the fingers or levers and are arranged to move in an arcuate path the upper part of the lower ends or toe pieces being formed with side projections or lugs adapted to engage with corresponding grooved out portions l^{5x} in the upper or body part of the finger or lever. The upper end of said toe pieces have toothed sectors l^{6x} with which engage worm wheels l^{7x} mounted in the upper or body part of the fingers or levers. The worm wheels l^{7x} terminate in knurled heads l^{8x} whereby the worm wheels can be readily rotated to adjust the toe pieces relatively to the upper or body part of the fingers or levers. Q^1, Q^2, Q^3, Q^4 are the bleed valves for controlling the operation of the severing shears (not shewn) of the machine. These valves are connected by means of flexible tubing r and pipes r^1, r^2 to the control valves of the shear operating cylinder R. There are altogether eight bleed valves, four serving to control the closing of the shears and four for controlling the opening thereof. Those seen in Figure 1 and marked Q^1, Q^2, Q^3, Q^4 control the closing of the shears, those for opening the shears being arranged behind as seen in Figure 2 wherein one

of said bleed valves, namely, Q^{1x} can be seen. Said bleed valves are arranged adjacent to the adjustable driving cams so that they can be operated by the cam projections a^1, b^1, c^1, d^1 during the rotation thereof. The bleed valves are adapted to be clamped by means of thumb screws q to arcuate shaped supports q^1, q^1 in which they can be readily adjusted relatively to the said cam projections on the driving cams thereby enabling the operation of the shears to be varied. When the shaft G is rotated by the shaft j and the worm J and worm wheel g^2 the plates E and F also rotate and carry round the shafts K^1, K^2, K^3, K^4 the latter imparting motion to the driving cams A, B, C, D in a clockwise direction through the pinions carried by the shafts and which are in engagement with the internal teeth on said driving cams, and the cam roller a on the driving cam A moves into contact with the toe piece of the adjustable finger or lever L^1 (see Figures 2 and 6) and angularly displaces it in an anticlockwise direction. The result of this displacement is a downward movement of the plunger P of the machine, movement being imparted to the plunger through the medium of the various pinions and shafts already described. At the same time that this movement takes place the pinion m^1 owing to its being in mesh with the pinion m is angularly displaced in a clockwise direction which results in the adjustable finger or lever L^{1x} being angularly displaced towards the driving cams so that the cam roller a in due course comes into contact with the toe piece of the adjustable finger or lever L^{1x} and displaces it radially in an anticlockwise direction into the position indicated by full lines in Figure 6. This movement of the adjustable finger or lever L^{1x} produces an angular displacement of the pinion wheel m in a clockwise direction and an up movement of the plunger P of the machine. The result of these angular displacements of the adjustable fingers or levers L^1 and L^{1x} is a discharge of molten glass from the machine and the return of the plunger into a position where it is ready to feed another gob on its next down stroke, also both adjustable fingers or levers L^1, L^{1x} have been returned into position ready to be again actuated by the cam roller a when it again arrives in the position shown in Figure 2. Just when the plunger of the machine commences its up stroke as the result of the cam roller a moving into contact with the toe piece of the adjustable finger or lever L^{1x} the cam projection a^1 operates the bleed valve Q^1 which in turn operates the control valve of the shear cylinder R to cause the piston therein to move forward and close the shears thereby severing the glass discharged by the plunger P of the machine. The cam projection on moving on then moves into contact with and operates the bleed valve Q^{1x} which results in the opening of the shears. This completes the operation of the driving cam A, the other driving cams B, C and D operating in sequence and in a like manner through the medium of their corresponding cam rollers b, c, d adjustable fingers or levers L^2, L^{2x}, L^3, L^{3x}, L^4, L^{4x} and their corresponding bleed vales Q^2, Q^{2x}, Q^3, Q^{3x}, Q^4, Q^{4x}. In Figures 2 and 6 the disposition of the adjustable fingers or levers is such as to effect a comparatively long up and down stroke and a quick return of the plunger P of the machine thereby resulting in a comparatively large amount of glass beign discharged by the plunger and representing the maximum length of stroke of the plunger in this particular machine. If it is desired to reduce the stroke of the plunger P and the consequent production of a smaller discharge of glass the adjustable fingers or levers are adjusted radially outwards by means of the knurled heads l^4 and l^{4x} so as to reduce the distance between their toe pieces and the cam rollers on the driving cams as shewn in Figure 7. If it is necessary to reciprocate the plunger P comparatively quickly the corresponding driving cam may be advanced by lifting one or other of the rods K^1, K^2, K^3 or K^4 as the case may be, so that its pinion comes out of engagement with the internally toothed recess in the plate E and the driving cam rotated to the desired extent by rotating the corresponding rod whose pinion is in engagement with the internal teeth on the corresponding adjustable driving cam. On the desired adjustment having been made the pinion on the rod in question is allowed to re-engage the internally toothed recess in the plate thereby locking the driving cam in its adjusted position. In Figure 7 the fingers or levers are adjusted for a comparatively short stroke of the plunger of the machine as aforesaid with a comparatively long dwell or pause between the plunger coming down and going up. If it is required to vary the dwell or pause between the down and up strokes of the plunger of the machine use is made of the mechanism provided for adjusting the toe pieces of the fingers or levers L^{1x} to L^{4x}. For example of the dwell or pause is required to be brief the toe pieces are adjusted inwardly by means

of the knurled heads l^{8x} into the position illustrated by Figure 8.

In the glass feeding machine above described, there are four adjustable driving cams which co-operate with eight adjustable fingers or levers, four of which control the down movement of the plunger of the machine and four the up movement thereof, and eight bleed valves, four of which control the closing of the severing shears and four the opening thereof, so that by suitably adjusting the said adjustable driving cams and adjustable fingers or levers it is possible to obtain four different sizes of gobs for delivery to the forming machine in succession during the rotation of the adjustable driving cams. We do not however wish to limit the invention to four driving cams as a different number of driving cams can be employed according to requirements. The mechanism above described is designed to operate with a continuously operating bottle-forming machine. If it is necessary to operate an intermittent air driven machine additional bleed valves can be arranged for operating the bottle forming machine and for driving the shaft j continuously a small variable speed motor can be used.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is :—

1. A glass feeding machine of the kind set forth, provided with means for independently varying the time and stroke of the plunger in either direction and for independently timing the action of the shears in each successive gob or mould charge discharged by the plunger for the purpose specified.

2. A glass feeding machine as in Claim 1, having a plurality of driving cams adapted to co-operate with a corresponding number of adjustable fingers or levers for imparting a reciprocating motion to the plunger of the machine and a corresponding number of bleed valves for controlling the operation of the severing shears.

3. A glass feeding machine as in Claim 2, in which the driving cams are in the form of internally toothed annular members arranged between two plates, said members being connected to one of said plates by means of axially movable shafts provided with pinion wheels adapted to engage said toothed annular members and a toothed recess in one of said plates for the purpose specified.

4. A glass feeding machine as in Claim 2, in which the adjustable fingers or levers are adapted to be displaced radially so as to cause their toe pieces to approach or recede from the path in which the driving cams rotate for the purpose specified.

5. A glass feeding machine as in Claim 2 or 4, in which the adjustable fingers or levers are carried in yoke like members provided with a worm adapted to engage a corresponding toothed portion on said fingers or levers substantially as described.

6. A glass feeding machine as in Claim 2, 3, 4 or 5, in which the adjustable fingers or levers for effecting the up stroke of the plunger of the machine are provided with adjustable toe pieces for the purpose specified.

7. A glass feeding machine as in Claim 2, 3, 4 or 5, in which the adjustable fingers or levers for effecting the up stroke of the plunger are made in two pieces, the lower or toe piece being capable to arcuate adjustment relatively to the upper part by means of a worm in engagement with a toothed sector on the toe piece substantially as described.

8. A glass feeding machine as in any of the preceding claims in which the severing shears are operated through adjustable bleed valves adapted to be controlled by cam projections on the driving cams.

9. A glass feeding machine having its parts constructed, arranged and adapted to operate substantially as hereinbefore described with reference to the accompanying drawings for the purpose specified.

Dated this 19th day of February, 1927.

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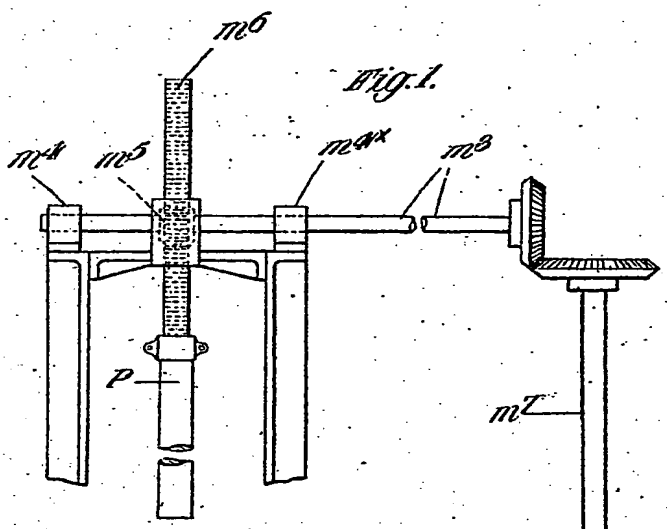
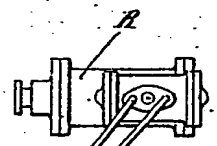
Fig. 1.





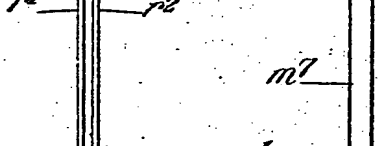
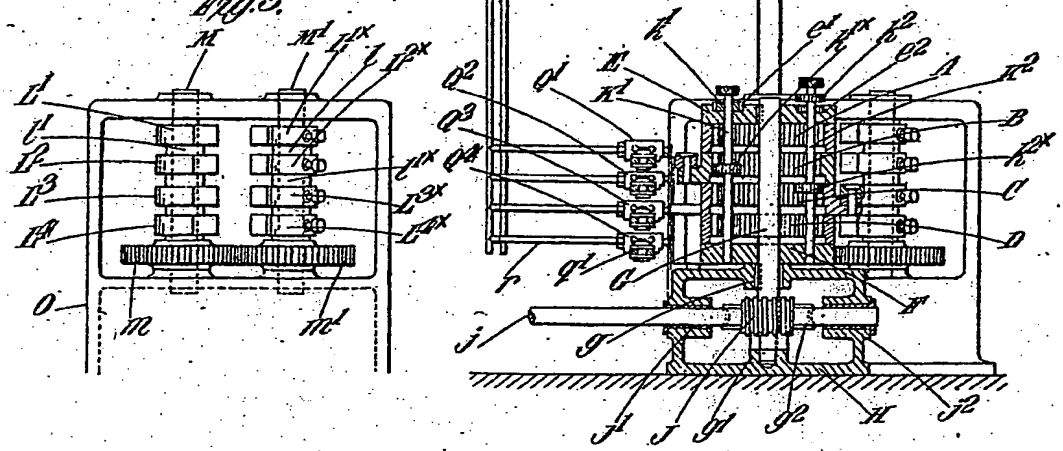


Fig. 3.



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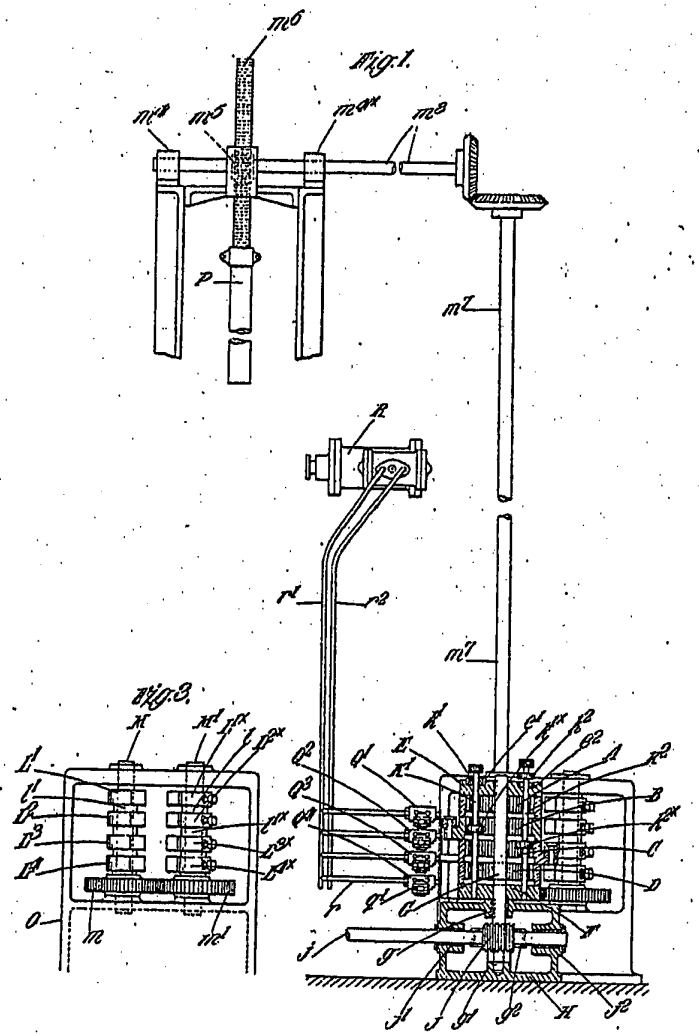
SHEET 1

2 SHEETS

SHEET 2

[This Drawing is a reproduction of the Original on a reduced scale.]



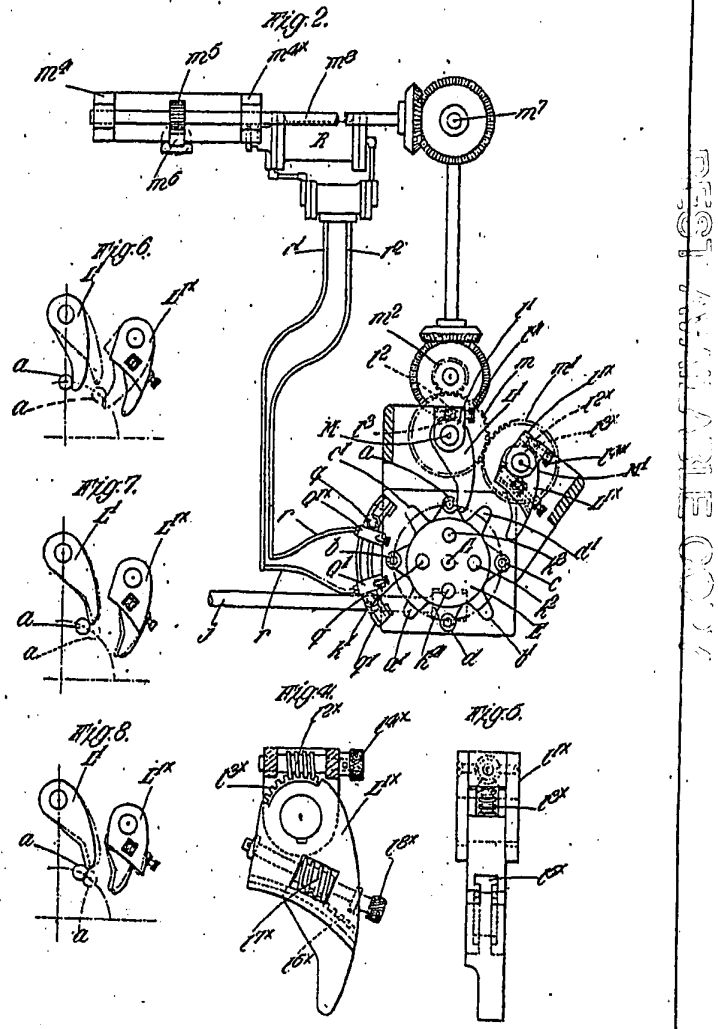


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Fig. 2.

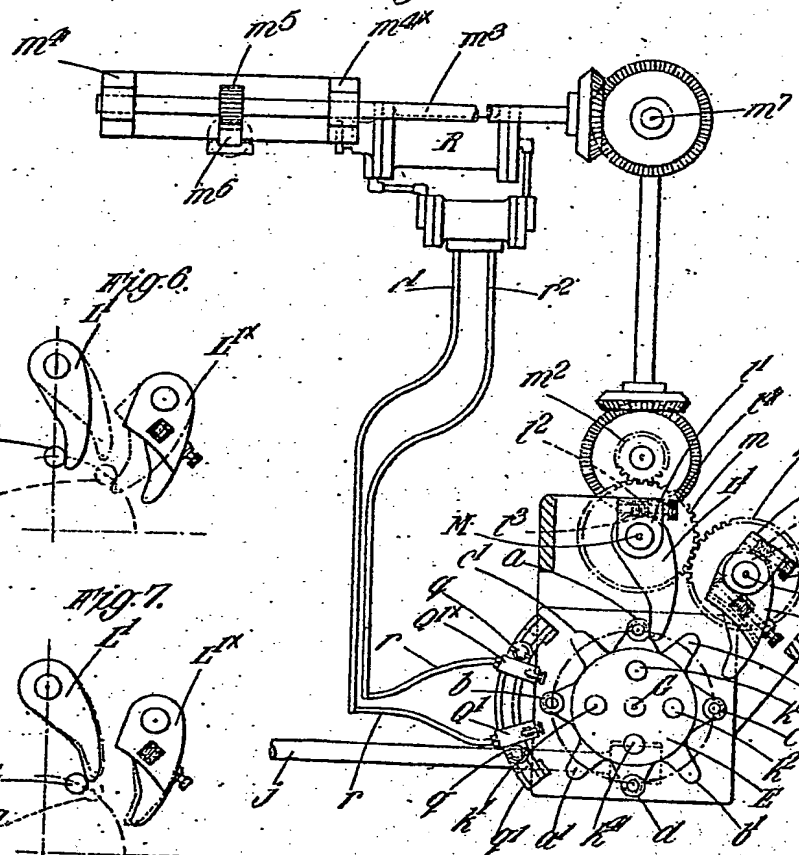
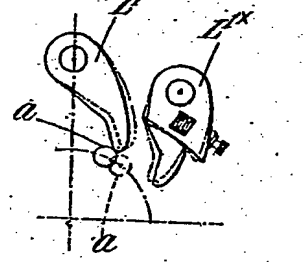


Fig. 6.

Fig. 7.

Fig. 8.



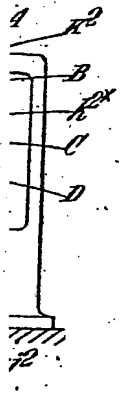


Fig. 4.

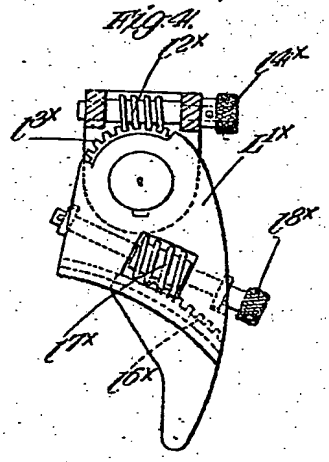
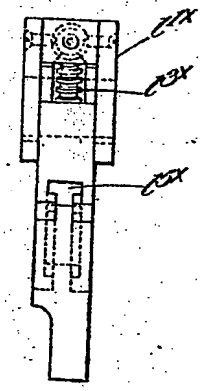


Fig. 6.



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